Moxa Industrial Media Converter

IMC-21 Hardware Installation Guide

Second Edition, June 2008

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P/N: 1802000210011

Overview

The Moxa Industrial Media Converter IMC-21 series consists of entry-level 10/100BaseT(X) to 100BaseFX and 10BaseT to 10BaseFL media converters that provide a cost-effective solution, and are specially designed for reliable and stable operation in harsh industrial environments.

IMC-21 accepts either a 12 to 45 VDC or 18 to 30 VAC power input. It operates reliably in a temperature range from -10 to 60°C, and IMC-21's rugged hardware design makes it ideal for demanding industrial applications, such as those that comply with FCC, CE.

NOTE Throughout this Hardware Installation Guide, we use **IMC** as an abbreviation for Industrial Media Converter:

IMC = Industrial Media Converter

Package Checklist

Moxa IMC-21 is shipped with the following items. If any of these items is missing or damaged, please contact your customer service representative for assistance.

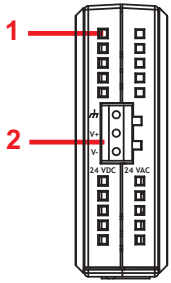
- IMC-21
- Hardware Installation Guide
- Moxa Product Warranty booklet

Features

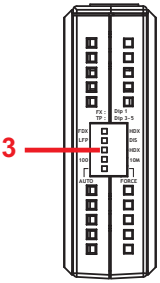
- Power inputs: 12 to 45 VDC; 18 to 30 VAC (47 to 63 Hz)
- TP port's connection speed, Half/Full duplex mode, and Force/Auto mode are DIP Switch selectable
- Fiber port's Half/Full duplex mode is DIP Switch selectable
- Supports Link Fault Pass-Through (LFP)
- TP port's MDI/MDI-X and half/full mode are DIP Switch selectable (for IMC-21-M-ST-FL)
- DIN-Rail mountable
- Multi mode and single mode models with SC or ST fiber connectors are available
- Operating temperature range from -10 to 60°C

Panel Layout of IMC-21 series

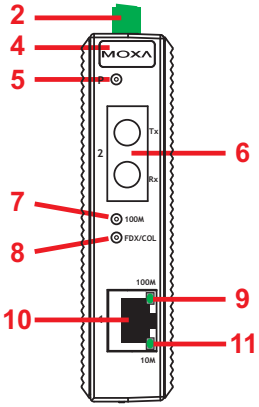
Top View



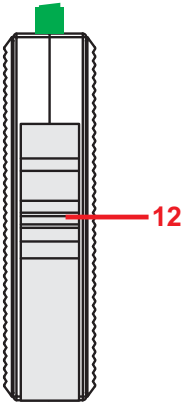
Bottom View



Front View



Rear View

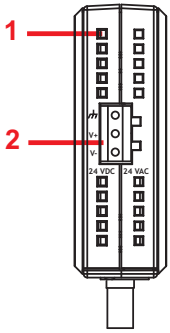


1. Heat dissipation orifices
2. Terminal block for power input and grounding
3. DIP switch
4. Moxa Logo
5. Power input LED
6. 100BaseFX (SC/ST connector) port
7. FX port's 100 Mbps LED
8. FX port's FDX/COL LED
9. TP port's 100 Mbps LED
10. 10/100BaseT(X) port
11. TP port's 10 Mbps LED
12. DIN-Rail kit

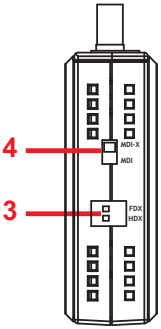
NOTE: The IMC-21 series includes IMC-21-M-SC, IMC-21-M-ST, and IMC-21-S-SC.

Panel Layout of IMC-21-M-ST-FL

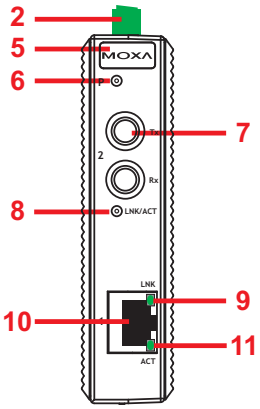
Top View



Bottom View

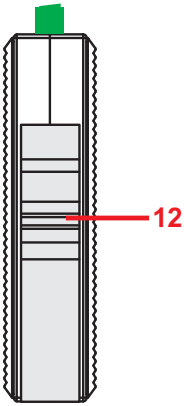


Front View



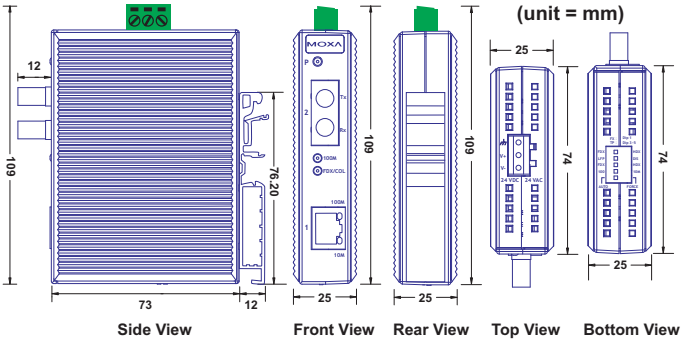
1. Heat dissipation orifices
2. Terminal block for power input and grounding
3. DIP switch
4. Slider switch
5. Moxa Logo
6. Power input LED
7. 10BaseFL (ST connector) port
8. FL port's LNK/ACT LED
9. TP port's LNK LED
10. 10BaseT port
11. TP port's ACT LED
12. DIN-Rail kit

Rear View

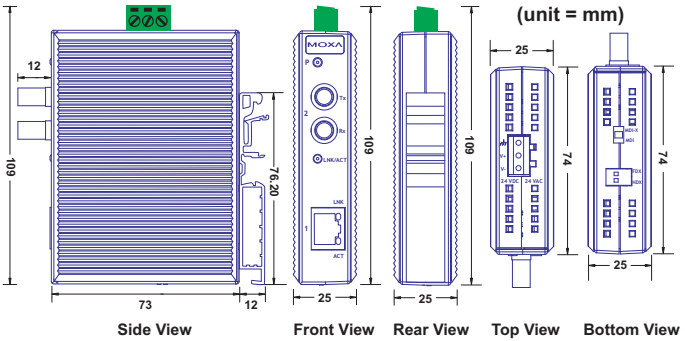


Mounting Dimensions

IMC-21 series (10/100BaseTX to 100BaseFX)

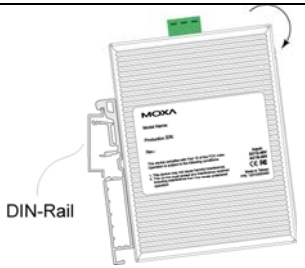
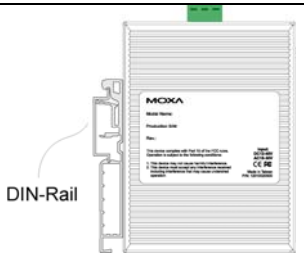


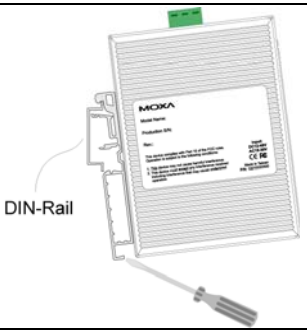
IMC-21-M-ST-FL (10BaseT to 10BaseFL)



DIN-Rail Mounting

The plastic DIN-Rail attachment plate should already be fixed to the rear panel of IMC when you take it out of the box. If you need to reattach the DIN-Rail attachment plate to IMC, make sure the DIN-Rail kit is situated towards the top, as shown in the figures below.

STEP 1: Insert the top of the DIN-Rail into the slot.	**STEP 2**: The DIN-Rail attachment unit will snap into place as shown below.
	

	To remove Moxa IMC-21 from the DIN-Rail, insert a flat-blade screw driver horizontally into the DIN-Rail kit under the IMC-21, and then pull it upwards and release IMC towards you away from the DIN-Rail.

Wiring Requirements

ATTENTION

Safety First!

Be sure to disconnect the power cord before installing and/or wiring your Moxa Industrial Media Converter.

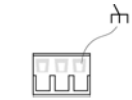
Calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum current allowable for each wire size.

If the current goes above the maximum rating, the wiring could overheat, causing serious damage to your equipment.

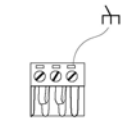
You should also pay attention to the following points:

- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.
- NOTE: Do not run signal or communications wiring and power wiring in the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.
- You can use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring that shares similar electrical characteristics can be bundled together.
- Keep input wiring and output wiring separated.
- It is strongly advised that you label wiring to all devices in the system when necessary.

Grounding Moxa Industrial Media Converter



Top View



Front View

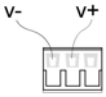
Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Run the ground connection from the right most connector of the 3-contact terminal block to the grounding surface prior to connecting devices.

ATTENTION

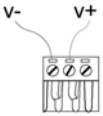
This product is intended to be mounted to a well-grounded mounting surface such as a metal panel.

Wiring the Power Inputs

The two left-most contacts of the 3-contact terminal block connector on IMC's top panel are used for IMC's DC or AC inputs. Top and front views of one of the terminal block connectors are shown here.



Top View



Front View

STEP 1: Insert the negative/positive DC wires into the V-/V+ terminals.

STEP 2: To keep the DC wires from pulling loose, use a small flat-blade screwdriver to tighten the wire-clamp screws on the front of the terminal block connector.

STEP 3: Insert the plastic terminal block connector prongs into the terminal block receptor, which is located on IMC's top panel.

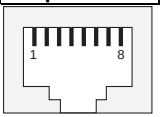
Communication Connections

IMC-21 has one 10/100BaseT(X) or 10BaseT Ethernet port.

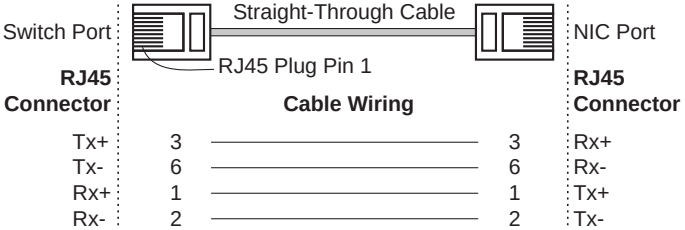
RJ45 Ethernet Port Connection

The 10/100BaseT(X) or 10BaseT port located on IMC's front panel are used to connect to Ethernet-enabled devices.

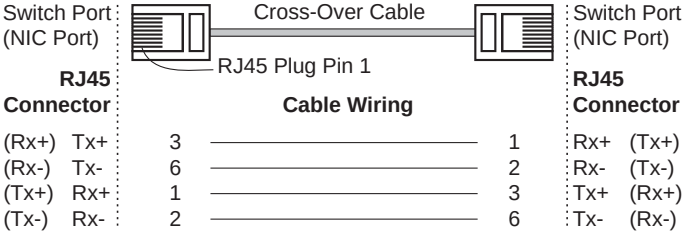
Below we show pinouts for both MDI (NIC-type) and MDI-X (HUB/Switch-type) ports, and also show cable wiring diagrams for straight-through and cross-over Ethernet cables.

MDI Port Pinouts		MDI-X Port Pinouts		8-pin RJ45
Pin	**Signal**	**Pin**	**Signal**	
1	Tx+	1	Rx+	
2	Tx-	2	Rx-	
3	Rx+	3	Tx+	
6	Rx-	6	Tx-	

RJ45 (8-pin) to RJ45 (8-pin) Straight-Through Cable Wiring



RJ45 (8-pin) to RJ45 (8-pin) Cross-Over Cable Wiring

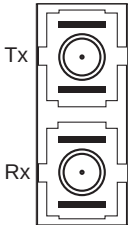

Switch Port (NIC Port)
Cross-Over Cable
Switch Port (NIC Port)
RJ45 Plug Pin 1
RJ45 Connector
Cable Wiring
RJ45 Connector
(Rx+) Tx+ 3 1 Rx+ (Tx+)
(Rx-) Tx- 6 2 Rx- (Tx-)
(Tx+) Rx+ 1 3 Tx+ (Rx+)
(Tx-) Rx- 2 6 Tx- (Rx-)

Fiber Optical Port Connection

The concept behind the SC/ST port and cable is quite straightforward. Suppose you are connecting devices I and II. Contrary to electrical signals, optical signals do not require a circuit in order to transmit data. Consequently, one of the optical lines is used to transmit data from device I to device II, and the other optical line is used transmit data from device II to device I, for full-duplex transmission.

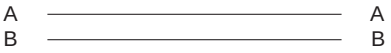
All you need to remember is to connect the Tx (transmit) port of device I to the Rx (receive) port of device II, and the Rx (receive) port of device I to the Tx (transmit) port of device II. If you make your own cable, we suggest labeling the two sides of the same line with the same letter (A-to-A and B-to-B, as shown below, or A1-to-A2 and B1-to-B2).

SC-Port Pinouts



SC-Port to SC-Port Cable Wiring

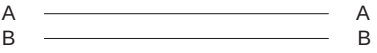
Cable Wiring



ST-Port Pinouts

ST-Port to ST-Port Cable Wiring

Cable Wiring

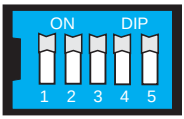


ATTENTION

This is a Class 1 Laser/LED product. To avoid causing serious damage to your eyes, do not stare directly into the Laser Beam.

DIP Switch Settings

IMC-21 Series (10/100BaseTX to 100BaseFX)



DIP Switch 1 (Default OFF: FDX)
FDX: Fiber port in full duplex mode
HDX: Fiber port in half duplex mode

DIP Switch 2 (Default OFF: LFP)
LFP: Enables LFP (Link Fault Pass-Through) for 100BaseFX
LFP DIS: Disables LFP for 100BaseFX

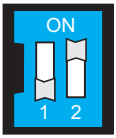
DIP Switch 3 (Default OFF: FDX)
FDX: TP port at full duplex mode
HDX: TP port at half duplex mode

DIP Switch 4 (Default OFF: 100)
100: TP port at 100 Mbps
10: TP port at 10 Mbps

DIP Switch 5 (Default OFF: AUTO)
AUTO: TP port in AUTO (auto-negotiation) mode
FORCE: Force TP port into 10M or half duplex mode

After changing the DIP switch setting, you will need to power off and then power on the IMC-21 to activate the new setting.

IMC-21-M-ST-FL (10BaseT to 10BaseFL)



	1	2	Description
FDX mode	ON	OFF	TP partner at full duplex mode
HDX mode	OFF	ON	TP partner at half duplex mode (default)

NOTE Only the above two settings for FDX and HDX modes are valid. The switches have no effect on the operation of IMC-21 if DIP switches 1 and 2 are both on, or both off.

MDI: TP port at MDI mode.
MDI-X (Default): TP port at MDI-X mode.

After changing the DIP switch setting, you will need to power off and then power on the IMC-21 to activate the new setting.

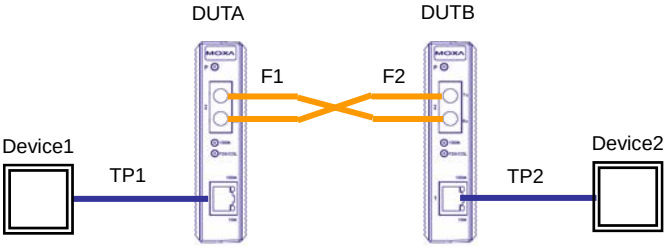
LED Indicators

The front panel of Moxa Industrial Media Converter contains several LED indicators. The function of each LED is described in the table below.

IMC-21 series (10/100BaseTX to 100BaseFX)

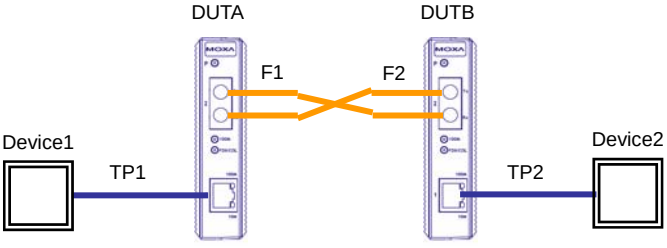
LED	Color	State	Description
P	AMBER	On	Power is being supplied to the power input.
		Off	Power is **not** being supplied to the power input.
100M (FX)	GREEN	On	FX port's 100 Mbps link is active.
		Blinking	Data is being transmitted at 100 Mbps.
		Off	FX Port's 100 Mbps link is inactive.
FDX/COL (FX)	GREEN	On	100BaseFX port is transmitting in full duplex mode.
		Blinking	A data collision has occurred.
		Off	100BaseFX port is transmitting in half duplex mode.
100M (TP)	GREEN	On	TP port's 100 Mbps link is active.
		Blinking	Data is being transmitted at 100 Mbps.
		Off	TP port's 100 Mbps link is inactive.
10M (TP)	GREEN	On	TP port's 10 Mbps link is active.
		Blinking	Data is being transmitted at 10 Mbps.
		Off	TP port's 10 Mbps link is inactive.

LFP DIP switch is set to “LFP” mode:



	Device1 TP LED	DUTA TP LNK LED	DUTA FO LED	DUTB FO LED	DUTB TP LNK LED	Device 2 TP LED
TP1 Faulted	OFF	OFF	OFF	OFF	OFF	OFF
F1 Faulted	OFF	OFF	OFF	OFF	OFF	OFF
F2 Faulted	OFF	OFF	OFF	OFF	OFF	OFF
TP2 Faulted	OFF	OFF	OFF	OFF	OFF	OFF

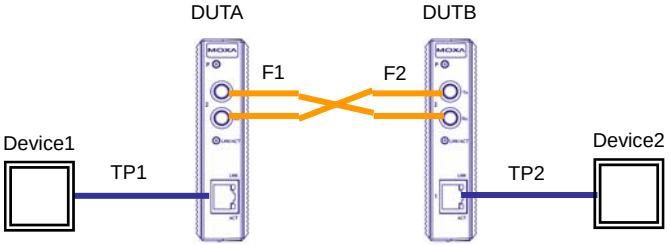
LFP DIP switch is set to “DIS” mode:



	Device1 TP LED	DUTA TP LNK LED	DUTA FO LED	DUTB FO LED	DUTB TP LNK LED	Device 2 TP LED
TP1 Faulted	OFF	OFF	ON	ON	ON	ON
F1 Faulted	ON	ON	OFF	OFF	ON	ON
F2 Faulted	ON	ON	OFF	OFF	ON	ON
TP2 Faulted	ON	ON	ON	ON	OFF	OFF

IMC-21-M-ST-FL (10BaseT to 10BaseFL)

LED	Color	State	Description
P	AMBER	On	Power is being supplied to the power input.
		Off	Power is **not** being supplied to the power input.
LNK/ACT (FL)	GREEN	On	Fiber port’s link is active.
		Blinking	Data is being transmitted at Fiber port.
		Off	Fiber Port’s link is inactive.
LNK (TP)	GREEN	On	TP port’s link is active.
		Off	TP port’s link is inactive.
ACT (TP)	GREEN	Blinking	Data is being transmitted at TP port.



	Device1 TP LED	DUTA TP LNK LED	DUTA FO LED	DUTB FO LED	DUTB TP LNK LED	Device 2 TP LED
TP1 Faulted	OFF	OFF	ON	OFF	ON	OFF
F1 Faulted	ON	ON	ON	OFF	ON	OFF
F2 Faulted	OFF	ON	OFF	ON	ON	ON
TP2 Faulted	OFF	ON	OFF	ON	OFF	OFF

Auto MDI/MDI-X Connection

The Auto MDI/MDI-X function allows users to connect Moxa Industrial Media Converter's 10/100BaseTX ports to any kind of Ethernet device, without paying attention to the type of Ethernet cable being used for the connection. This means that you can use either a *straight-through* cable or *cross-over* cable to connect IMC to Ethernet devices.

Dual Speed Functionality and Switching

Moxa Industrial Media Converter's 10/100 Mbps switched RJ45 port auto negotiates with the connected device for the fastest data transmission rate supported by both devices. All models of Moxa Industrial Media Converter are plug-and-play devices, so that software configuration is not required during installation, or for maintenance. The half/full duplex mode for the switched RJ45 ports is user dependent and changes (by auto-negotiation) to full or half duplex, depending on which transmission speed is supported by the attached device.

Auto-Negotiation and Speed Sensing

Moxa IMC-21 series' RJ45 Ethernet port supports auto-negotiation in 10BaseT and 100BaseTX modes, with operation governed by the IEEE 802.3u standard. This means that some nodes could be operating at 10 Mbps, while at the same time, other nodes are operating at 100 Mbps.

Auto-negotiation takes place when an RJ45 cable connection is made, and then each time a LINK is enabled. Moxa Industrial Media Converter advertises its capability for using either 10 Mbps or 100 Mbps transmission speeds, with the device at the other end of the cable expected to advertise similarly. Depending on what type of device is connected, this will result in agreement to operate at a speed of either 10 Mbps or 100 Mbps.

If a Moxa Industrial Media Converter RJ45 Ethernet port is connected to a non-negotiating device, it will default to 10 Mbps speed and half-duplex mode, as required by the IEEE 802.3u standard.

Specifications

Technology

Standards	IEEE802.3, 802.3u, 802.3x

Interface

RJ45 Port	**For IMC-21 (10/100BaseTX to 100BaseFX):** 100BaseTX **For IMC-21 (10BaseT to 10BaseFL):** 10BaseT
Fiber Port	**For IMC-21 (10/100BaseTX to 100BaseFX):** 100BaseFX (SC, ST connectors available) **For IMC-21 (10BaseT to 10BaseFL):** 10BaseFL (ST connector only)
LED Indicators	**For IMC-21 (10/100BaseTX to 100BaseFX):** Power, 10/100M (TP port), 100M (Fiber port), FDX/COL (Fiber port) **For IMC-21 (10BaseT to 10BaseFL):** Power, LNK/ACT (Fiber port), LNK and ACT (TP port)
DIP Switch	**For IMC-21 (10/100BaseTX to 100BaseFX):** • TP port's connection speed and Half/Full duplex mode and Force/Auto mode are DIP switch selectable • Fiber connection's Half/Full duplex mode is DIP switch selectable • Link Fault Pass-Through (LFP) is also DIP switch selectable **For IMC-21 (10BaseT to 10BaseFL):** • TP port's MDI/MDI-X and Fiber port's Half/Full mode are DIP switch selectable

Fiber Optics

	Multi mode (10BaseFL)	Multi mode (100BaseFX)	Single mode (100BaseFX)
Distance, km	2	5	40
Wavelength, nm	820	1310	1310
Min. TX Output, dBm	-16	-20	-5
Max. TX Output, dBm	-7	-14	0
Sensitivity, dBm	-34.1	-34 to -30	-36 to -32

Power

Input Voltage	12 to 45 VDC, 18 to 30 VAC (47 to 63 Hz)
Power Consumption	5 W
Connection	Removable 3-contact Terminal Block
Overload Current Protection	0.15 A
Reverse Polarity Protection	Present

Mechanical

Casing	IP30 protection, plastic case
Dimensions	25 × 109 × 97 mm (W × H × D)
Weight	125 g
Installation	DIN-Rail mounting

Environmental	
Operating Temperature	-10 to 60°C (14 to 140°F)
Storage Temperature	-40 to 70°C (-40 to 158°F)
Ambient Relative Humidity	5 to 95% (non-condensing)
Regulatory Approvals	
Safety	UL 508 (pending)
EMI	FCC Part 15, CISPR (EN55022) class A
EMS	EN61000-4-2 (ESD), EN61000-4-3 (RS), EN61000-4-4 (EFT), EN61000-4-5 (Surge), EN61000-4-6 (CS),
Shock	IEC 60068-2-27
Free Fall	IEC 60068-2-32
Vibration	IEC 60068-2-6
WARRANTY	5 years

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